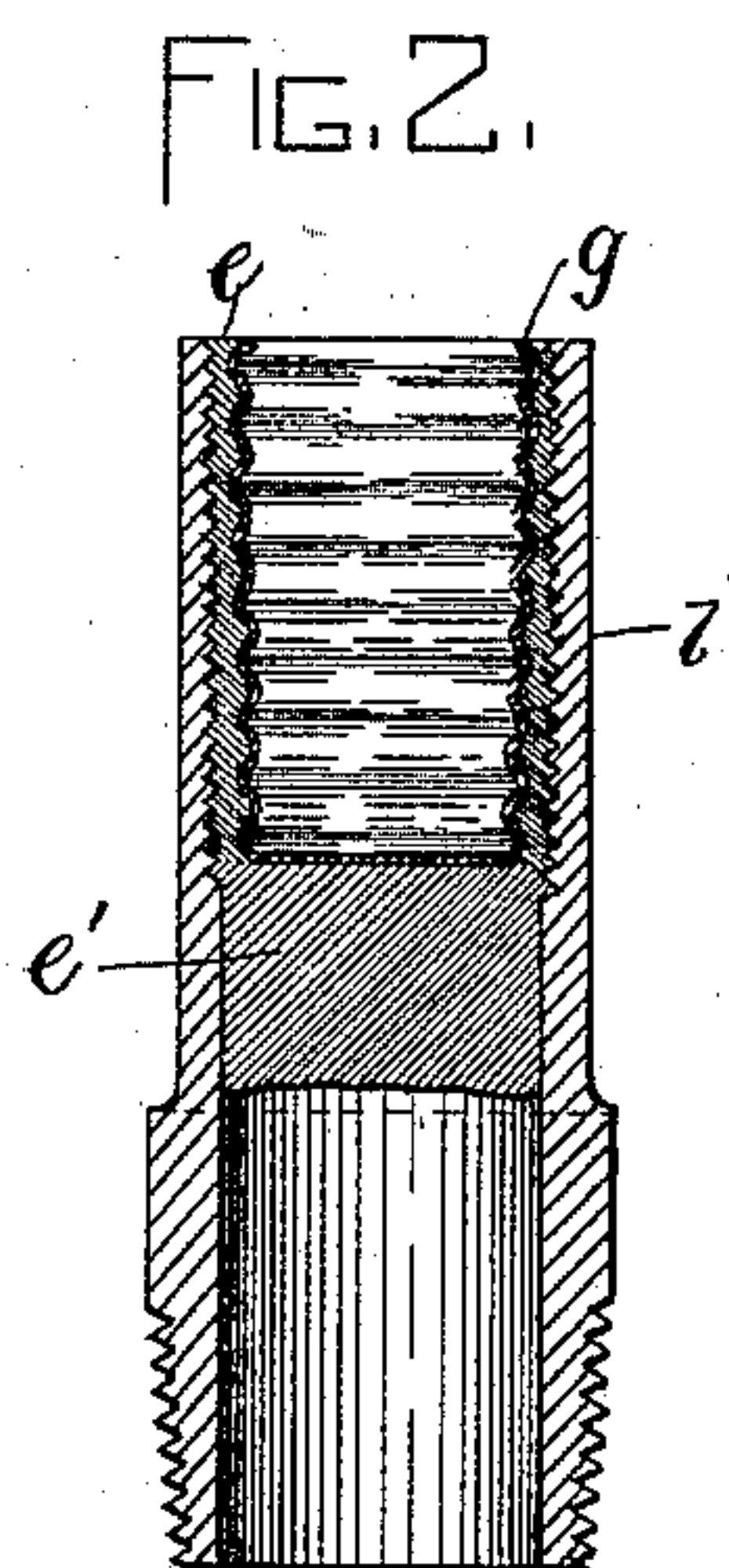
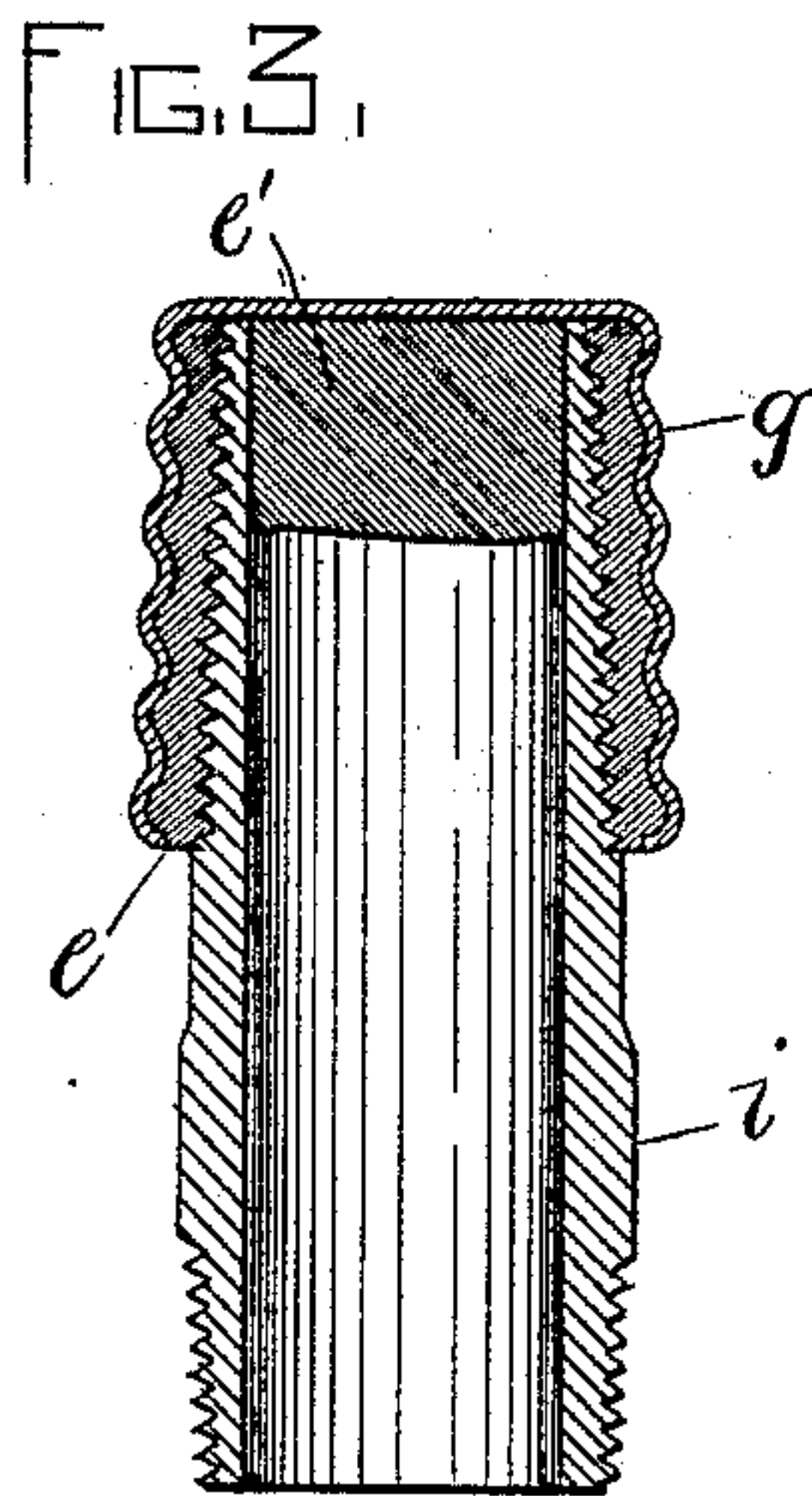
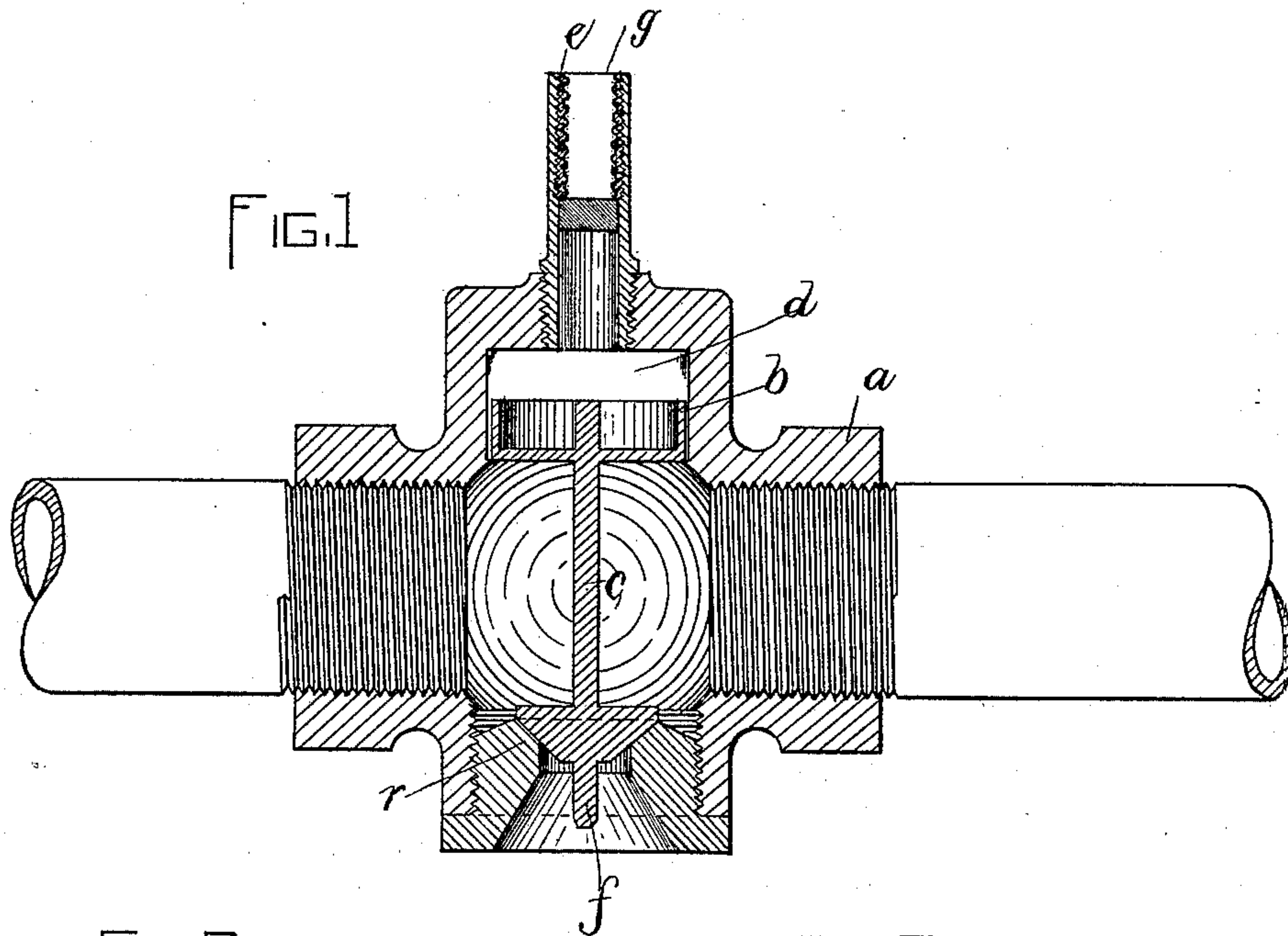


(No Model.)

J. R. GRAY.
AUTOMATIC FIRE EXTINGUISHER.

No. 408,302.

Patented Aug. 6, 1889.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JAMES R. GRAY, OF AYER, MASSACHUSETTS.

AUTOMATIC FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 408,302, dated August 6, 1889.

Application filed March 25, 1889. Serial No. 304,765. (No model.)

To all whom it may concern:

Be it known that I, JAMES R. GRAY, a citizen of the United States, residing at Ayer, in the county of Middlesex and State of Massachusetts, have invented a certain new and useful Improvement in Automatic Fire-Extinguishers; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention has for its object to provide a sprinkler-head having a construction by means of which the pressure of the water in the pipes to which the sprinkler is attached shall be utilized to hold the valve to its seat when the sprinkler is not in operation, and thereby prevent the danger of leakage, and at the same time the force of the same pressure shall be utilized to force the valve open when the usual fusible joint has been melted and it is desired that the sprinkler should come into operation.

My invention is further designed to provide an improved form of fusible joint which shall be released by the action of heat.

Referring to the accompanying drawings, Figure 1 is a central vertical section of my improvement. Fig. 2 is an enlarged sectional view of the fusible joint. Fig. 3 is an enlarged sectional view of a modified arrangement of the parts which constitute the fusible joint.

In Fig. 1 the casing *a* is adapted to be connected with the distributing-pipes in the usual manner. This casing is provided with the valve-seat *r* and also with the chamber *d*, such chamber being preferably located over and in line with the valve-seat and above the surface of the water in the casing *a*, although it may be located at the side of or below the casing. The chamber *d* is provided with a vent or outlet closed by means of a fusible joint, as hereinafter described.

The valve *f* is seated upon the valve-seat *r* in the usual manner. It is provided with the valve-stem *c* and head *b*, the head being connected with the valve by means of the stem and having an area greater than that of the valve *f*. It is also fitted loosely within the chamber *d* and is adapted to move freely up and down therein.

The operation of the valve is as follows: The outlet or vent to the chamber *d* being closed by means of the fusible joint and the head *b* being fitted loosely, the pressure passes freely around the head and into the chamber above it, so that the pressure is the same on both sides of the head, and it is therefore neutral in its effect upon the valve *f*, leaving the entire pressure to operate upon the valve to force it to its seat. Should the fusible joint be now softened by the action of heat, the pressure within the chamber *d* will force the joint open and the pressure within the chamber and above the head *b* will at once be relieved, while the pressure on the under side of the head will continue as before, and its area being greater than that of the valve *f* the valve will be lifted from its seat by the excess of pressure and the water will escape through the opening *o* of the valve-seat.

It is obvious that the head *b* may fit very loosely in the chamber *d*, provided that it exceeds in area the valve *f*, and provided, also, that the capacity of the outlet to the chamber is at least equal to the leakage around the head, so that there shall be no accumulation of pressure above the head after the vent has been opened by the action of heat. The vent or outlet to the chamber *d* is closed and controlled by means of a fusible joint formed in connection with the nipple *i*. The upper end of the nipple is provided with one or more grooves or indentations, which may be either internal or external, as preferred. The plug *g*, which closes the outlet, is also provided with similar grooves or indentations, and is seated to the nipple by means of fusible material imposed between such parts and received into the said grooves or indentations, as shown at *e*. This material is preferably of a non-metallic substance, as paraffine-wax, resin, &c., such substances being more sensitive to the action of heat and less liable to change their softening-point after long dis- use than is the case with metallic substances.

The plug *g* is preferably made hollow, as shown, in order to present a greater surface to the action of heat, and the grooves or indentations serve to further increase such surface and also to insure the holding of the plug against the pressure. In practice I usually

prefer to make the nipple and plug tapering, as shown, in order that the plug may be released and forced out more promptly when the fusible material has become softened by the heat of a fire, the grooves or indentations being sufficient to hold the plug against the pressure at normal temperatures.

It is not essential that such grooves or indentations be formed in both the nipple and plug, as it is sufficient to form them in one only when the pressure is not excessive. I have found by experiment that a non-metallic substance having a degree of hardness sufficient to hold against the internal pressure cannot be depended upon to form an air-tight joint at *e*. To provide against this and insure against leakage, I apply at *e'* a non-metallic substance of a less degree of hardness and sufficiently soft to adhere at all times to the interior of the nipple *i*, and adapted to be softened and pushed out in the same manner as the harder section above. By thus closing the outlet from the chamber *d* by means of sections of fusible material of different degrees of hardness a new and useful result of great practical value is secured.

I do not limit myself to the use of the plug *g* in closing the outlet to the chamber *d*, as it is obvious that the plug may be omitted and the outlet be filled with a plug made entirely from fusible material. Neither do I limit myself to the use of grooves or indentations to hold the plug against the pressure, as the same results may be obtained by means of a reverse taper or by perforations or other well-known equivalent means.

In some cases also I have found it more convenient to reverse the parts *i* and *g*, as shown in Fig. 1, the plug being inverted and acting as a cap to close the outlet, but combined and sealed to the nipple by means of the fusible material at *e* in the same manner as in Fig. 1.

It will be seen that by the arrangement of the parts *i*, *g*, and *e*, as shown, the plug or cap *g*, which closes the vent or outlet to the chamber *d*, is insulated from contact with the nipple *i* by means of the fusible material *e*, so that none of the heat which may be taken up by the plug or cap in case of fire can be conducted away by the walls of the nipple *i* without first passing through the fusible material *e*, which is softened by such passage and the plug or cap released. This fact renders the device very sensitive to the action of the heat of a fire.

It is obvious that when the casing *a* is to be attached to the end of a pipe-line one of the pipe-connections shown may be omitted; also that this arrangement and method of operating the valve is applicable to faucets and other forms of valves, in which case the vent or outlet to the chamber would be controlled by any convenient means for opening and closing the same. In practice the head *b*

may be made to fit the bore of the chamber *d* and the pressure admitted into the chamber by means of perforations through the head. I regard the loose fit as preferable, however.

Having thus described my invention, what I claim is—

1. In an automatic fire-extinguisher, a casing adapted to be connected to the water-pipes, and provided with a valve-seat having an opening for the escape of water and with a chamber located in line with the valve-seat, said chamber having an outlet closed by means of a fusible joint, combined with a valve provided with a head connected with and having an area greater than that of the valve and fitted loosely within said chamber, substantially as set forth.

2. In an automatic fire-extinguisher, a vent or outlet and a plug or cap to close the same, the walls of both of such parts being grooved or indented to receive the fusible material which unites them and tapered to release such cap or plug more promptly, substantially as set forth.

3. In an automatic fire-extinguisher, a vent or outlet and a plug or cap to close the same, the walls of both such parts being grooved or indented and sealed together by means of fusible material imposed between them and received into the said grooves or indentations, combined with a section of fusible material of a less degree of hardness imposed between the harder fusible material and the internal pressure to prevent the escape of such pressure, substantially as described.

4. The nipple or outlet *i*, having its walls grooved or indented, and the plug *g*, having its walls grooved or indented, the said plug being counterbored to expose its interior to the action of heat, and sealed to the said nipple by means of fusible material imposed between them and received into the said grooves or indentations, substantially as set forth.

5. A casing adapted to be connected with the water-pipes, a valve-seat within the casing having an opening for the escape of water, a chamber located in line with the valve-seat and communicating with the interior of the casing, a valve held to the valve-seat by the internal pressure, a head connected with and having an area greater than that of the valve and fitted within the said chamber, and which permits the pressure to pass freely from the casing into the chamber above the head, and a vent or outlet from the chamber whose area exceeds the leakage into the chamber, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JAMES R. GRAY.

Witnesses:

WILLIAM BROWN,
WILLIAM N. COWLES.